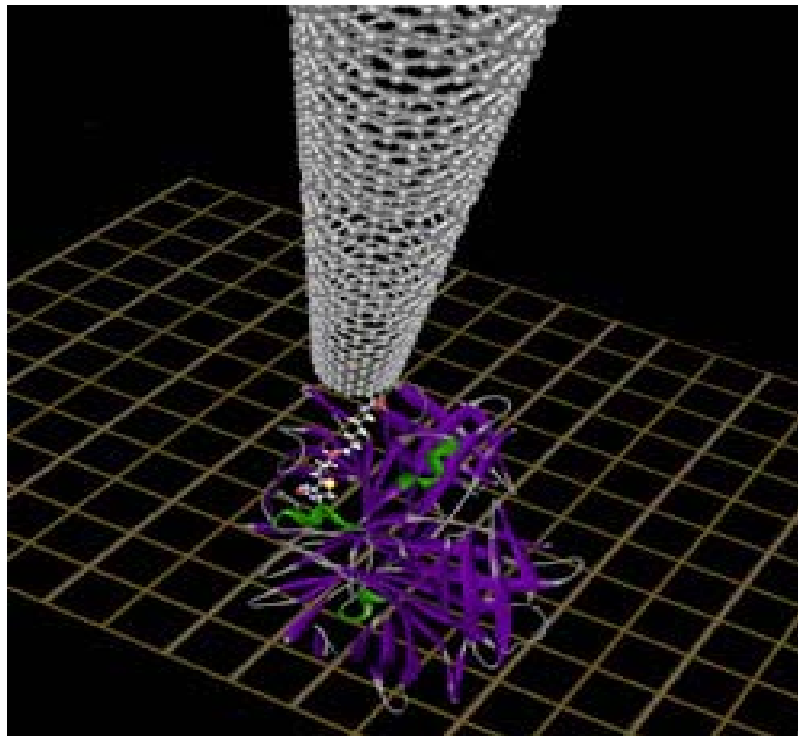


CHAPTER 3

BIOLOGICAL PHYSICS

Carbon-nanotube-based chemical force microscopy



Single-Molecule Studies of RNA and Protein Enzymes

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Complex biological processes, such as transcription, translation, protein folding and RNA folding, involve a rich set of kinetic paths and transient states. These processes may be understood more clearly by single molecule studies that allow one to look beyond ensemble averages and to observe the distributions and time-trajectories of individual molecules. In this talk, I will present some recent single molecules studies of RNA and protein enzymes in the Steven Chu Group. First, I will use a simple model system, an RNA three-way junction, to demonstrate that fluorescence resonance energy transfer (FRET) is an effective way to study the conformational changes of bio-macromolecules. Then I will discuss our results from studies of the folding and catalysis of RNA enzymes, Tetrahymena and hairpin ribozymes, and the activity of a protein enzyme, DNA helicase.